

AMENDMENT OF THE CLAIMS TO INVENTION:

Please cancel claims 1-38 without prejudice or disclaimer, and add new Claims 39-55 as follows:

Claims 1-38 (canceled)

Claim 39 (new): A PC-based computing system comprising:

- system memory for storing software graphics applications, software drivers and graphics libraries, and;

- an operating system (OS), stored in said system memory;

- one or more graphics applications, stored in said system memory, for generating a stream of geometrical data and graphics commands supporting (i) the representation of one or more 3D objects in a scene having 3D geometrical characteristics and (ii) the viewing of images of said one or more 3D objects in said scene during an interactive process carried out between said PC-based computing system and a user of said PC-based computing system;

- one or more graphic libraries, stored in said system memory, for storing data used to implement said stream of geometrical data and graphics commands;

- a central processing unit (CPU), for executing said OS, said graphics applications, said drivers and said graphics libraries;

- an CPU interface module for interfacing with said CPU;

- a PC bus;

- a graphics processing subsystem interfaced with said CPU interface module by way of said PC bus; and

- a display surface for displaying said images by graphically displaying frames of pixel data produced by said graphics processing subsystem;

- wherein said graphics processing subsystem includes:

- a plurality of graphic processing units (GPUs) arranged in a parallel architecture and operating according to said parallelization mode of operation so that said GPUs support multiple graphics pipelines and process data in a parallel manner,

one or more GPU drivers, stored in said system memory, for allowing said GPUs to interact with said graphic libraries;

one or more software hub drivers, stored in said system memory,

a hardware hub, interfacing with said CPU interface module and said GPUs, by way of said PC bus, and having a hub router for (i) distributing the stream of geometrical data and graphic commands among said GPUs, and (ii) transferring pixel data output from one or more of said GPUs during the composition of frames of pixel data corresponding to final images for display on said display surface;

wherein said CPU interface module provides an interface between said one or more software hub drivers and said hardware hub;

wherein said one or more software hub drivers perform the following functions:

- (i) controlling the operation of said hardware hub,
- (ii) interacting with said OS and said graphic libraries, and
- (iii) forwarding said stream of geometrical data and graphic commands, or a portion thereof, to each said GPU over said PC bus; and

wherein, for each image of said 3D object to be generated and displayed on said display surface, the following operations are performed:

- (i) said hardware hub uses said hub router and said PC bus to distribute said stream of geometrical data and graphic commands, or a portion thereof, to said GPUs,
- (ii) one or more of said GPUs process said stream of geometrical data and graphic commands, or a portion thereof, during the generation of each said frame, while operating in said parallelization mode, so as to generate pixel data corresponding to at least a portion of said image, and
- (iii) said hardware hub uses said router and said PC bus to transfer said pixel data output from one or more of said GPUs and compose a frame of pixel data, representative of the image of said 3D object, for display on said display surface.

Claim 40 (new): The PC-based computing system of Claim 39, wherein said CPU interface module is an I/O interface module.

Claim 41 (new): The PC-based computing system of Claim 40, wherein said I/O interface module is an I/O chip or chipset.

Claim 42 (new): The PC-based computing system of Claim 39, wherein each said GPU has a frame buffer (FB) for storing a fragment of pixel data.

Claim 43 (new): The PC-based computing system of Claim 39, wherein said geometrical data comprises a set of scene polygons or vertices.

Claim 44 (new): The PC-based computing system of Claim 39, wherein said graphics commands includes commands selected from the group consisting of display lists and display vertex arrays.

Claim 45 (new): The PC-based computing system of Claim 39, wherein said hardware hub further comprises a control unit for accepting commands from said one or more software hub drivers, over said PC bus, and controlling components within said hardware hub, including said hub router.

Claim 46 (new): The PC-based computing system of Claim 39, wherein said hub router routes said stream of geometrical data and graphic commands from said graphics application to one or more of said GPUs, and wherein said hub router routes pixel data results from said GPUs during the composition of said frame of pixel data.

Claim 47 (new): The PC-based computing system of Claim 39, wherein said hardware hub further comprises a memory unit for storing intermediate processing results from one or more of said multiple GPUs and data required for composition and transferring frames of pixel data for display.

Claim 48 (new): The PC-based computing system of Claim 39, wherein said one or more software hub drivers control said GPUs while said hardware hub operates transparently to said

graphics application so that said multiple GPUs appear as only a single GPU to said graphics application.

Claim 49 (new): The PC-based computing system of Claim 39, wherein said one or more software hub drivers coordinate the operation of said GPUs so generate a continuous sequence of frames of pixel data for displaying a sequence of images of said 3D object on said display surface.

Claim 50 (new): The PC-based computing system of Claim 39, wherein said hardware hub handles multiple bus paths between said CPU and said GPUs.

Claim 51 (new): The PC-based computing system of Claim 39, wherein said parallelization mode of operation is a time division mode of parallel operation, wherein each said GPU renders a different frame of pixel data for display on said display surface at a different moment of time.

Claim 52 (new): The PC-based computing system of Claim 39, wherein said parallelization mode of operation is an image division mode of parallel operation, wherein each GPU renders a subset of the pixels used to compose each frame of pixel data to be displayed on said display surface.

Claim 53 (new): The PC-based computing system of Claim 39, wherein said parallelization mode of operation is an object division mode of parallel operation, wherein the 3D object which is to be displayed as an image consisting of a frame of pixels, is decomposed into said stream of geometrical data and graphic commands which are distributed to said GPUs for rendering the frames of pixel data compositing the images to be displayed on said display surface.

Claim 54 (new): The PC-based computing system of Claim 39, wherein each said 3D object is decomposable into a plurality of polygons, and wherein said geometrical data comprises the vertices of said polygons.

Claim 55 (new): The PC-based computing system of Claim 39, wherein each pixel associated with a frame of pixel data includes attributes selected from the group consisting of color, alpha, position, depth, and stencil.